

extensive reference lists would be useful. However, most of these references have little to do with the general theory of holography and coherent optics.

Unfortunately I find this very expensive book most unappealing. Most of the material is dated; much of it has been presented in other (much shorter and more recent) volumes; and there are very few references to original sources. Had this book been published in English shortly after it was published in Russian, many of the above comments would be unnecessary. In fact, I question the publisher's reasoning in presenting such an obviously carefully done book at this late date.

MARY E. COX

University of Michigan-Flint

Introduction to Nuclear Reactions

G. R. Satchler

327 pp. Halsted (Wiley), New York, 1980.
\$59.95

Most of our information about nuclei comes from their reactions with electrons, nucleons, mesons and more massive projectiles. Because of the diversity of these phenomena and theories about them, it has been difficult to find or write any satisfactorily inclusive description of this field. Therefore it is gratifying to have, at last, an excellent introductory survey that is useful both to beginning graduate students for self study and to trained nuclear physicists who will appreciate its pointed insights and reference material. Written as a brief textbook for English undergraduates, this handsome book is unfortunately priced beyond the reach of its most likely users.

Its author, Ray Satchler, preeminent in direct-reaction theory and coauthor with David Brink of a successful, compact book on angular-momentum theory, is a master of clear presentation of theoretical ideas.

The book begins with a brief introduction to nuclear physics, which is followed by an orderly qualitative description of typical low-energy reaction experiments and the phenomena they disclose. Longer chapters present scattering theory and its applications to explicit nuclear models. There are excellent and copious illustrations as well as comparisons to experiment. Also provided are appendices on angular momentum, on the lab to center-of-mass transformation and on some standard data.

The discussion of scattering theory summarizes the simple wave-mechanical analyses of low-energy direct reactions. Some of this material has not previously been given in textbooks. The

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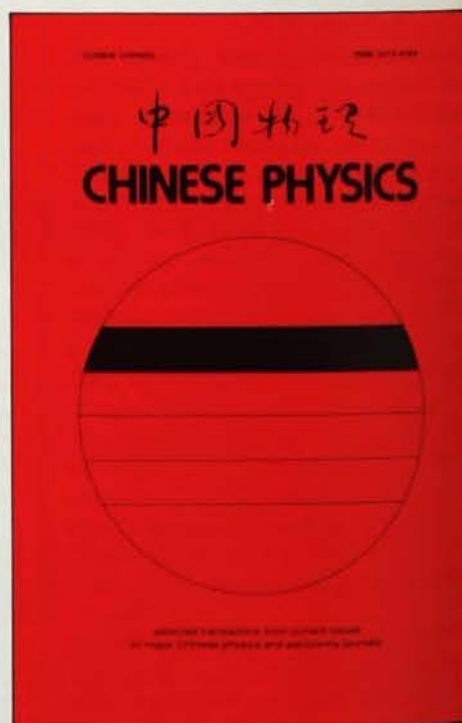
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treatment of semiclassical ideas is unusually clear. Nevertheless readers might have benefited by being alerted to the existence of ideas beyond the traditional material, such as multiple-scattering formalisms or exact coupled-equation theories of few-body rearrangement reactions. For example, Faddeev theory is not mentioned; a derivation of the Lippmann-Schwinger equation (not named) refers to it as the integral equation equivalent to the entire original problem. Even a beginner should be told there is an extensive literature about the variety of possible integral equations and their assorted blemishes. I also note that the nice, somewhat phenomenological, approach to compound nucleus ideas entirely avoids the formalism of the boundary-matching theories.

The application of the theory to explicit models has many valuable lessons. In one of my favorites, Satchler points out that often with a model "the more general its nature, the less physical content it tends to have." The subsequent discussion shows how insights can be reaped from a series of worked-out examples of explicit models, even if each individual example has limited applicability. This is a helpful lesson for a new student, or for an experienced practitioner.

NORMAN AUSTERN
University of Pittsburgh

book notes

Recent Developments in Gauge Theories (NATO Advanced Study Series, Ser. B, Vol. 59)

G. 't Hooft, C. Itzykson, A. Jaffe, H. Lehmann, P. K. Mitter, I. M. Singer, R. Stora, eds. 445 pp. Plenum, New York, 1980. \$49.50

The present volume consists of papers based on the lectures of the 1979 Cargèse summer school. The central endeavor of the papers is the application of non-Abelian gauge theory to the problem of quark confinement. The principal subjects discussed are non-perturbative methods in continuum and lattice gauge theory and some related mathematics.

There are three fine papers by G. 't Hooft on renormalizable gauge theories, on topological confinement mechanisms and on naturalness and the gauge-hierarchy problem. There is a useful paper by C. G. Callan on the Princeton semiclassical approach to confinement and its relation to the work of E. Creutz. There is a typically clear paper by E. Witten on the $1/N$ expansion. These five papers by them-

selves make the book worthwhile.

And there is more: by C. Itzykson, G. Mack, G. Parisi and K. G. Wilson on lattice gauge theory; by M. F. Atiyah and R. Bott on Morse theory; by M. Lüscher on instantons; by V. Poenaru and G. Toulouse on condensed-matter physics; by J. -L. Gervais and A. Neveu on strings; by J. Frölich, J. Glimm, A. Jaffe and K. Symansik on mathematical physics; by J. Zinn-Justin on σ models; and by P. K. Mitter on orbits.

As this litany indicates, some subjects are omitted. Little or no attention

is paid to supersymmetry, supergravity, grand unification or perturbative QCD.

The Cargèse summer institute is sponsored in part by NATO. It is regrettable (and, in view of its participation in NATO, somewhat ironic) that the US Department of Defense supports no domestic research that is not directly related to weapons.

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